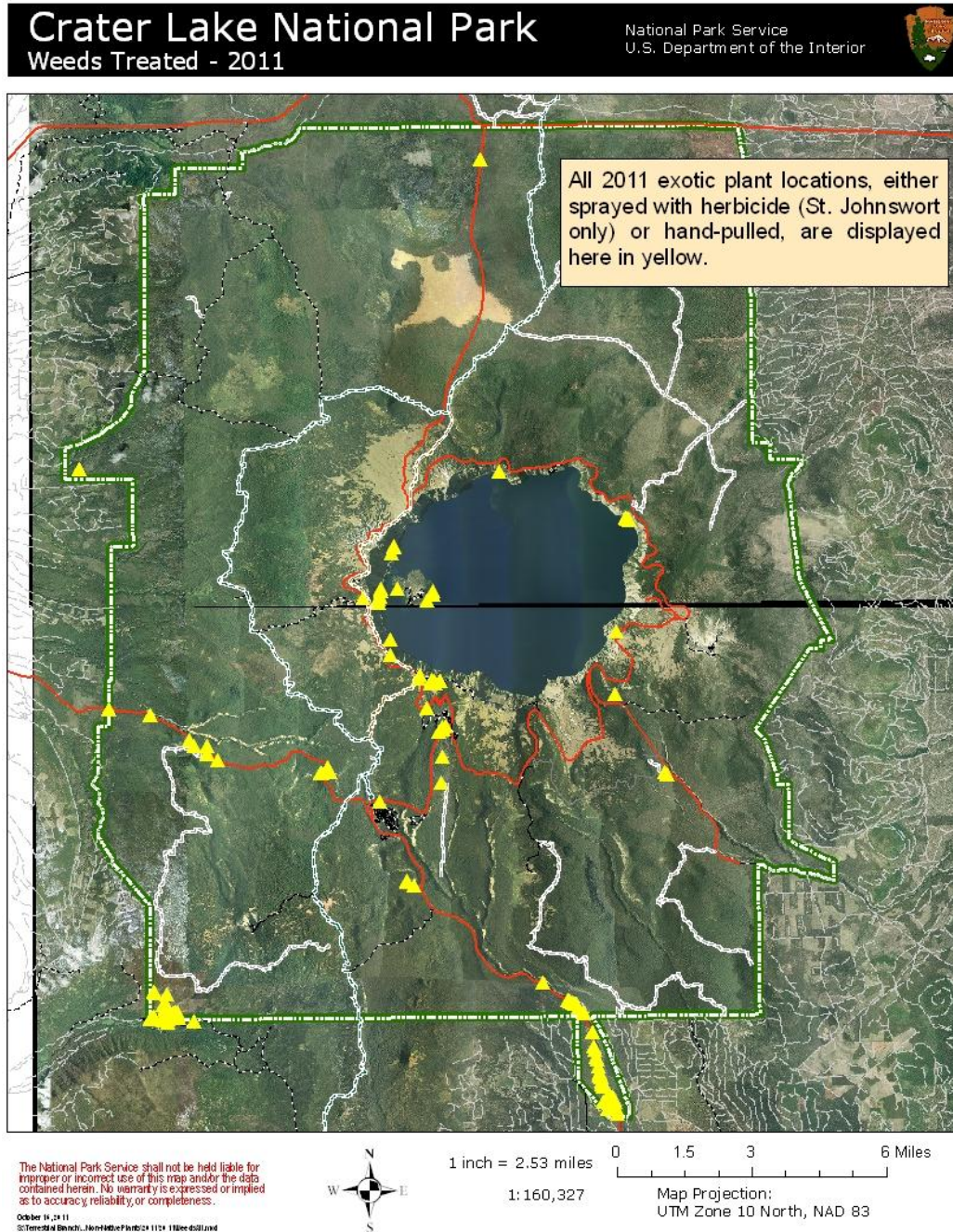


Exotic Plant Report, 2011 Crater Lake National Park



CRATER LAKE NATIONAL PARK

EXOTIC PLANT REPORT 2011

Kathryn Williams

2011 Exotic Plant Accomplishment Summary

- Completion of Lonesome Burn weed survey (year 3 of 3);
- ODA Treatment of *Hypericum perforatum* ("St. Johnswort") with herbicide "Vista" (5th year);
- Surveyed yards and quarries for weeds to prevent spread of weedy materials;
- Pulled weeds on shores of Crater Lake, including the shores of Wizard Island;
- Surveyed Panhandle roadside weeds and pulled non-St. Johnswort exotics;
- Weed-pull at Spruce Lake (high-water year in 2011);
- First year pulling weeds at West Highway 62 road re-route locations (see 2010 report for locations).

This year I returned for my seventh season at Crater Lake National Park. Also this year, a full-time botanist, Jen Beck, was hired beginning late-winter/ early-spring. Seasonal employees Cameron Rolle and Elena Thomas completed the botanical crew of 2011. In this report, I will describe exotic plant activities that occurred this summer.

INTRDUCTION

The Winter and Spring of 2010/2011

Winter and spring was atypical this year. Not only did the Park receive a record amount of snow, but that snow persisted far longer into the summer than on average. On average, snow melts away at Park headquarters on June 20th; This year, headquarters was snow-free on July 24th -- the longest snow persistence since 1931. This had an effect on exotic plant operations this year: plant phenology was pushed back by a few weeks; the water level of Crater Lake was higher than usual, providing some dampening of lakeshore weed abundance; and Spruce Lake's water level was back high again after last year's lower water level, likely inhibiting the growth of some weeds there.

Protocol

In previous years, we georeferenced only *significant* (i.e., more than five individuals) populations of weeds that were NOT noxious, and *all* locations of NOXIOUS weeds regardless of population size. This year, the seasonal bio techs took the lead of their head botanist and georeferenced ALL weeds pulled. All weeds pulled were documented on "Non-Native Plant Assessment" forms or "Burn Area Survey Forms". All data were entered into the Exotic Plant Database (S:\Terrestrial Branch\Vegetation\Non-native Plants\Exotic Plant Database) and assigned a unique number which is handwritten on each datasheet. **All 2011 GPS data collected used a NAD83 projection.**

WEEDS BY LOCATION

Roadside Weeds

Many weeds were treated along the roadsides of the Park. St. Johnswort was sprayed with an herbicide (“Vista”), where the remainder of the documented weeds were hand-pulled (Table 1.) Rumex acetosella (sheep sorrel, or, “Rumace”) continues to multiply along sections of all roadside areas. This is not reflected well by Table 1, as we only had time to pull Rumace in a few select locations this year.

Table 1. Roadside Weeds Treated, 2011

Species	S. Hwy 62	W. Hwy 62	Munson Valley Road	Rim Road	N. Entrance Road	Pinnacles Road
<i>Centaurea stoebe ssp. micranthos</i>				1		
<i>Chamaesyce maculate</i>		2 – 5m2				
<i>Chenopodium album</i>		9				
<i>Dactylis glomerata</i>	11	1				
<i>Hypericum perforatum</i>	213	Plants were treated, but not counted	Plants were treated, but not counted	3	1+ uncounted patches at north entrance rd boundary	
<i>Leucanthemum vulgare</i>	44		1			
<i>Phleum pretense</i>		6				
<i>Plantago lanceolata</i>	339					
<i>Poa annua</i>						17
<i>Poa bulbosa</i>	232					
<i>Rumex acetosella</i>	2,558 + 2 – 5m2		6 – 10m2	100		
<i>Spergularia rubra</i>		1m2				
<i>Spergularia macrotheca</i>		1m2				
<i>Taraxacum officinale</i>			27		17	
<i>Tragopogon dubius</i>	2					
<i>Trifolium repens</i>		61				
<i>Verbascum thapsus</i>	15	13				

On August 16, 2011, two members of the Oregon Department of Agriculture (ODA) herbicide crew came to treat St. Johnswort with the herbicide Vista – this is the fifth year that the Park has employed this control method following many years of fruitless hand-pulling. In previous years, ODA had come a few weeks earlier in the summer, but as this was a record-breaking snow persistence year, application was delayed to try and treat the plants at the optimal time (flowering). To arrive at an annual reduction estimate, St. Johnswort plants are counted each year and in the Panhandle. Because of the amount of roadside soil disturbance in the Panhandle this year, our annual comparison of Hypper densities is not so pure: some of the weeds may have been scraped away; on the other hand, with shrub removal, new plants may have suddenly become more visible. Despite these complications, a comparison of St. Johnswort densities can be found in Table 2.

Table 2. Panhandle St. Johnswort densities by year.

Year	Number of Plants
2011	213
2010	234
2009	600
2008	958
2007	2,630

All known Hypper plants throughout the Park were slated to be treated, except for the population down in the caldera. Some individuals were missed, and later pulled. The population out on East Rim Drive had been scraped away by road crew activities, so it was not “pulled” nor “treated”. Crew leader Bob Barrett from ODA will be retiring before next summer, so it is uncertain if we will be able to continue our relationship with them in 2013.

Highway 62 – South. The Panhandle region and Lonesome burn area share the distinction of having the highest weed diversity of any location surveyed in 2011, with eight exotic plant species each (Table). No new weed species were found in the Panhandle this year, but one species disappeared from our list – spotted knapweed, which had been present in the Panhandle for many years.

Aside from the unusually high amount of persistent snow, roadside maintenance activity had an effect on this year’s roadside weed surveys. Clearance of roadside brush, which hadn’t occurred in several years, began this July on South Highway 62 in the Panhandle. By the time vegetation management staff noticed that not just brush removal, but soil disturbance was occurring, the road crew had already scraped approximately two miles of road length in the northern Panhandle (Figures 1 through 3). Botanical staff had worked diligently for years, hand-pulling weeds (some of them noxious), and treating St. Johnswort. Two of those battles appeared near completion: Spotted knapweed patches went from a peak of more than 300 individuals in 2007 to only two in 2010; St. Johnswort densities were as high as 2,630 in the Panhandle in 2007, and were reduced to 234 by 2010. Soil disturbance can stimulate germination of “sleeping” weed seed and growth from root fragments of rhizominous weed species. Unfortunately, the significantly scraped area passed right through the near-eradicated population of spotted knapweed (Figure 4). It is uncertain how weed densities were affected by brush-removal activities this year. It will be very important to look closely at these sites in 2013 for possible renewed exotic plant growth. To see more documentation of the scraping operations, see “Roadside Vegetation Management Impacts.pdf” on the S:\ drive. (...Non-native plants\2011\.)



Figure 1. Soil disturbance in the Panhandle.

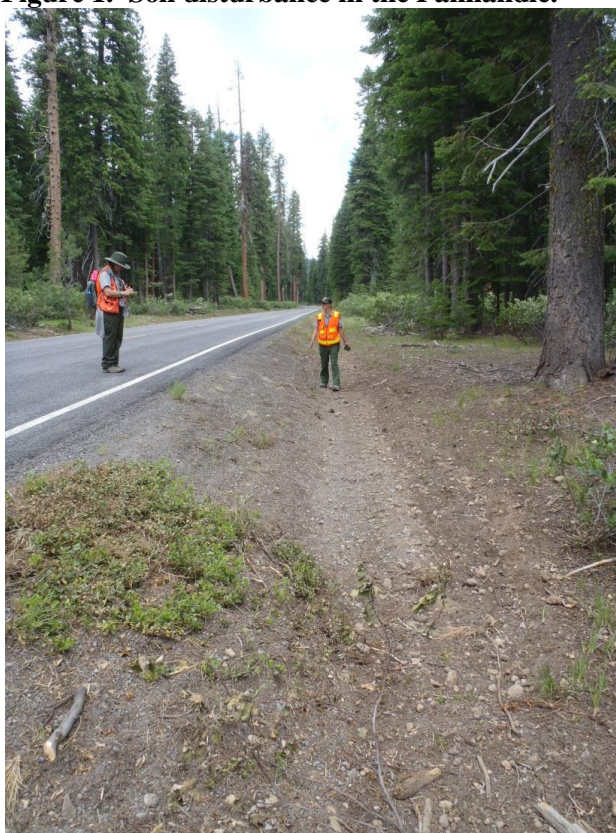


Figure 2. Surveying for weeds, and soil disturbance.

Crater Lake National Park

Weeds Treated, S. Highway 62 - 2011

National Park Service
U.S. Department of the Interior

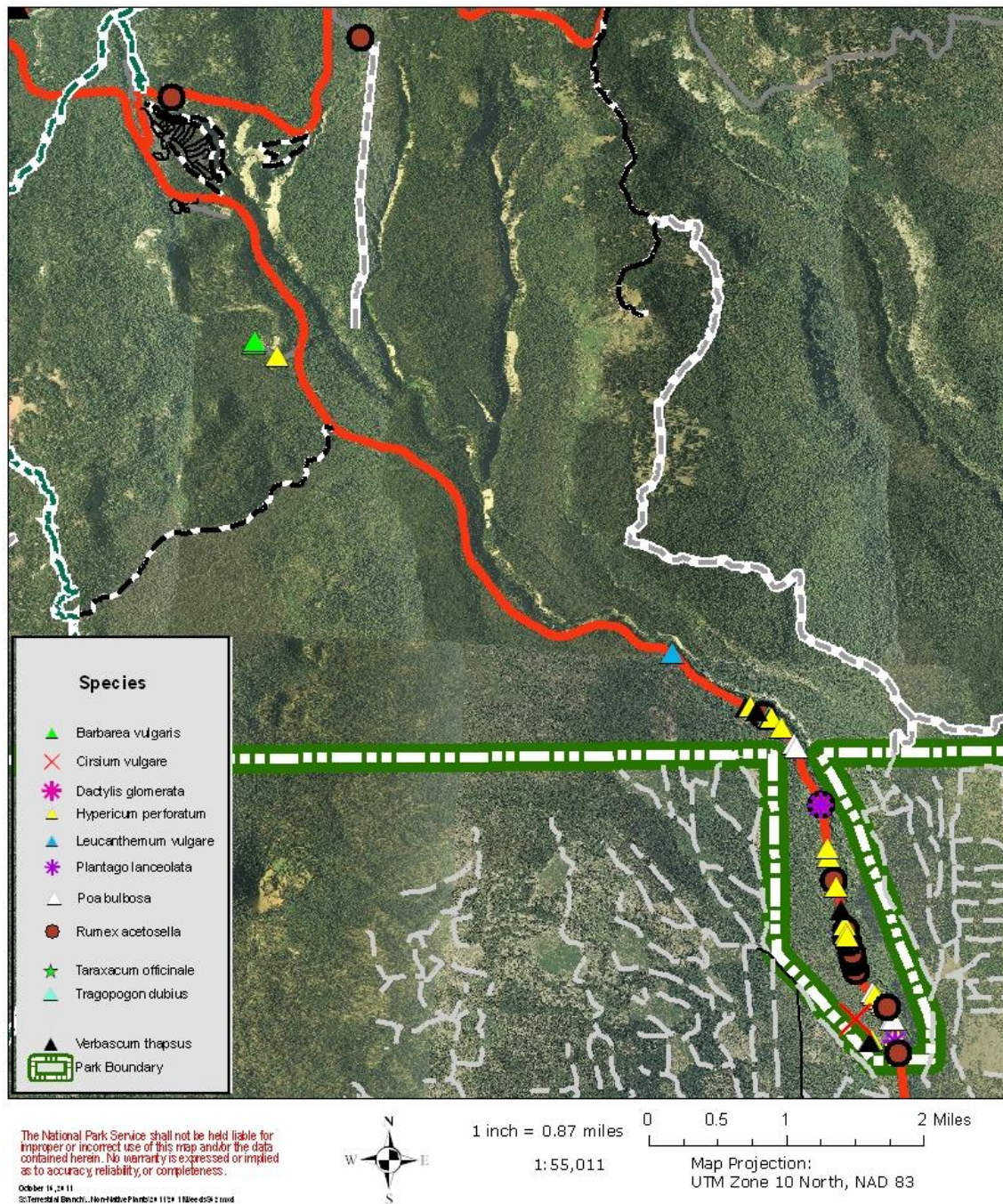


Figure 3. Weeds treated in the Panhandle, 2011.

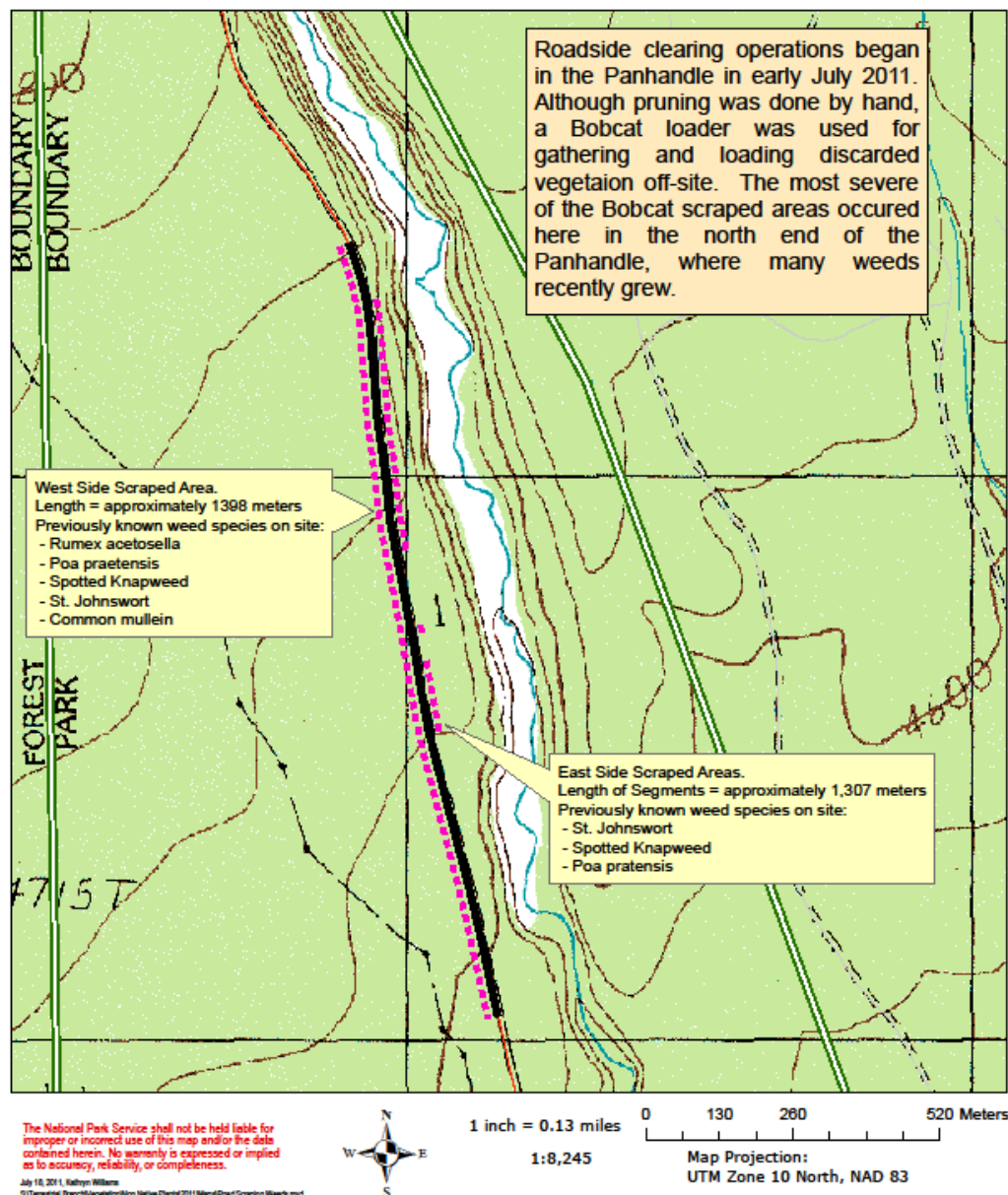


Figure 4. Areas where road clearance crews scraped the soil, depicted here by the dotted pink lines.

Highway 62 – West. This marks the first year that Park staff were responsible for surveying 2006 Highway 62 re-route areas for weeds. In previous years, that job was contracted out to Wildlands, Inc. in Washington state. The locations of these four areas are clearly described in previous exotic plant reports. Weeds were found at only two of the four locations: at the corkscrews, and at Old West (Table 3). The open roadside area near the west entrance sign should also continue to be checked each year for weeds, since a few of the same Highway 62 re-route weeds have also been found there.

Table 3. Weeds found in Highway 62 West re-route areas.

Species	Corkscrews	Old West	West Entrance Sign
<i>Verbascum thapsus</i> (common mullein)	9	0	0
<i>Trifolium repens</i> (white clover)	58+	1	0
<i>Spergularia rubra</i> (sand spurry)	0	1m2	0
<i>Chenopodium album</i> (lambsquarter)	3	0	6
<i>Chamaesyce maculata</i> (spotted spurge)	0	0	2-5m2

Roads - Other. Since we don't have time to walk every mile of road each year to document and pull weeds, we instead rely on documentation from previous years and drive-by weed sightings to locate and pull invasive weeds. South Highway 62 remains the weediest of all sections of road, helped no doubt by its lower elevation and close proximity to neighboring forests abundant in exotic plants. The most important weed sighting this year apart from Highway 62 was a spotted knapweed plant growing in a crack where a stone wall meets the pavement near the palisades on East Rim Drive. Although there was only one plant found and it was pulled before it developed fruit, there was forensic evidence of last year's stem, dried and gone to seed attached to this year's shoot. This is not the first time we have found a second-year shoot growing in this location. Since this plant was found next to a wall that overlooks the Lake, it will be important to check the caldera shore beneath next year to be sure that no spotted knapweed seed germinated down on the Lake. No known populations of Censto have been documented on the lake shore, and if one develops there, it could be very difficult to reach and pull those locations on steep caldera slopes.

High Impact Areas

Quarries/ Storage Yards. The following quarries and yards were surveyed for weeds this year: South Yard, Pole Creek Quarry, Anderson Bluffs Quarry, and Roundtop Quarry.

The South Yard ("SY") and Pole Creek Quarry ("PCQ") remain very active sites, with daily large-equipment activity occurring throughout the summer. There were three weed sites pin flagged in PCQ last year, and the Roads Foreman was informed of their locations, and of the need to let those areas "rest", untouched, until we are certain we have depleted stored weed seed in those locations. The only weed found in PCQ last year was yellow rocket (*Barbarea vulgaris*, or "Barvul"). Last year, one of the three Barvul locations got scraped up by a bulldozer before we could put pin flags up delineating the weedy area. This year, 17 Barvul plants were pulled from that location. One of the Barvul patches from 2010 was nearly entirely scraped away, probably during an asphalt pile removal operation. It is unnerving to see these weedy areas disturbed, not knowing if Barvul seed is being pushed and redistributed elsewhere, either in the quarry area, or deposited somewhere else in the Park. PCQ, in particular, needs to be surveyed early in the year in order to re-establish weed locations, preferably before major quarry operations begin for the summer. This year we located and pulled 207 sand spurry plants from upper PCQ – this weed was not noticed last year.



Figure 5. *Barbarea vulgaris* growing near the Anderson Bluffs Quarry.

The South Yard has been home to several weed populations for several years. One location at the far end of the Yard, I had dubbed “Weed Alley” several years ago. Hundreds of mullein, bull thistle & St. Johnswort plants coexisted there near a 40 foot stretch of Ponderosa pine seedlings and saplings. After years of hand-pulling and letting the area “rest” from large equipment activities, few mullein plants germinated this year (only 15), and no bull thistle – a significant reduction from 2003 when I first began documenting this location. This year we counted 26 St. Johnswort plants which were later treated with the herbicide, Vista.

Anderson Bluffs quarry is located near the trailhead for the new Plaikni Falls Trail. The only weeds found there were two populations of *Barbarea vulgaris* – the same patches we have been hand-pulling for three years now. A total of 1,000 plants were pulled from these two locations, with a large minority of them having been pulled a month following the initial treatment. This emphasizes the need to revisit *Barvul* patches more than once a growing season to be sure to pull all plants before seed sets.

Roundtop quarry was found to be weed-free.

All quarries and yards need to be surveyed for exotic plants early in the season in order to try and prevent weed seedbank disturbance and spread. This information needs to be communicated to the Roads Foreman at the beginning of each season, with a summary of weed locations and densities by season’s end.

Rim Village. Many (132, this year) common dandelions growing in the lodge landscape were hand-pulled, with occasional white clover plants. Heading out towards the Garfield Peak trailhead, one comes across thousands of sheep sorrel plants (approximately 5,140 plants pulled this year, with many more remaining) located along the walkway from the Lodge to the trailhead, spreading out into native meadow land. Although hand-pulling has not proved effective at reducing sheep sorrel densities, until we have another means of control, it is our only means of defense against this aggressive invader.

Headquarters/ Park Housing. Approximately 100 common dandelion plants were pulled from this area. Few persistent, small populations of St. Johnswort were treated (one sprayed with Vista, one patch was missed and therefore hand-pulled). Once patch of sheep sorrel was located and pulled; this should be revisited in 2012 to try and reduce further spread of this lone patch.

Campgrounds. Mazama campground was not officially surveyed for weeds in 2011. The only weed found in previous surveys of the campground was a patch of St. Johnswort near the gas pump area, and it has not reappeared in a few years. Lost Creek campground supports a few areas of common dandelion located alongside the creek (124 plants pulled in 2011).

Remote Areas

Crater Lake Shores. This year, there were two trips taken on the lake to search for weeds. Given the record snow year, persistent snow banks and the high water level of the lake, we didn't get out to pull weeds there until late August/ early September. Even in mid-October on a trip to Crater Lake, I noticed remnant snow patches down on the Watchman bench and below the lodge area. Many of the weeds – primarily Canada thistle (“Cirarv”) – were found growing in up to a foot of water near the lake's shores. (In a more average snow year, a majority of the thistles are found on dry ground near the shoreline, or in just a few inches of water.) Overall, there were fewer weeds found and pulled this year, but the results are mixed (Table 4). For example, in one location, despite the high water, one patch that was pulled in 2008 on Wizard Island increased nearly three-fold (from 24 individuals to 69 in 2011). In another location on the Watchman bench, there were a mere 11 Cirarv plants in 2011, down from 72 in 2008. The year 2011 should be remembered as an interesting anomaly, and not used summarily as a weed density comparison year in future reports.

Table 4. Weeds pulled in caldera, 2011.

Location	CirArv	Cirvul	Hypper	Taroff	Vertha
Watchman Bench	281	21	0	11	0
Wizard Island	100	0	156	0	Patch not seen this year; may have been missed, or under snow.



Figure 6. Pulling Canada thistle in nearly one foot of water on the shores of Wizard Island



Figure 7. Pulling Canada thistle in a difficult, rocky substrate beneath Wineglass, Crater Lake Shores

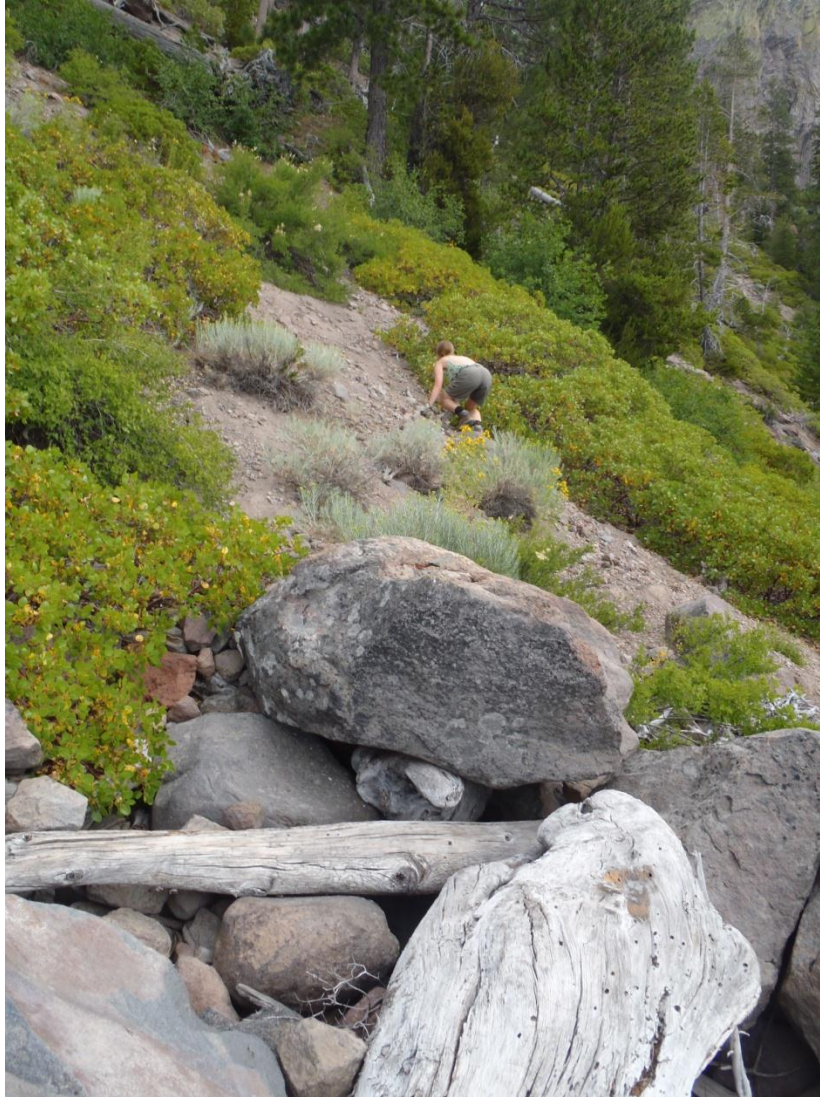


Figure 8. St. Johnswort growing on steep scree, below Wineglass, Crater Lake shores

Spruce Lake. Not surprisingly, 2011 was a high-water year in Spruce Lake. On August 2, three personnel pulled the following weeds from Spruce Lake: Canada thistle (112); bull thistle (91); and common mullein (219). When the water level is high, the work is swift (about one half of a day, including the drive) at Spruce Lake.

The Lonesome Burn, year 3 of 3. This year, much of the focus of our search for weeds in the Lonesome Burn area of the Park focused on the plethora of weeds growing near the southern Park boundary on steep, rocky slopes, often in ephemeral drainages. Year one of this project, we tried to survey the entire burn unit to a 90% probability of detection accuracy, and found ourselves spending too much time for the amount of time and personnel we had on hand (and, we found no weeds). The beginning of year two (2010), Kathryn consulted with local fire ecologists and land managers to come up with a reasonable sampling plan for the 2,023 acre burn area – details of the sampling plan are described in the 2010 Lonesome Burn report; our focus that year was primarily on high severity burn patches just north of the very steep southern section of the Park’s burn unit.

Park personnel made a total of seven visits to the Lonesome Burn in 2011. The first two visits (late July) centered around revisiting the ten weed sites found in 2010, pulling and documenting any re-emergent exotics. In the upper part of the burn area, many snow patches remained from winter and spring, but as we got closer to the steeper, south-facing areas, no snow remained, and many of the flowering plants were in bloom. Due to the steepness of slope, we only felt comfortable revisiting nine out of the ten sites.

The Lonesome Burn's remote location and difficult accessibility make for long days in the field. Our third visit entailed an all-day tour of the area, starting by being dropped off near the NW boundary of the burn, hiking east/ south-east to Stuart Falls, then following the Falls trail back out to the west, picking up a vehicle we had shuttled there the day before. What we saw that day was impressive: severely burned areas in the northeast section (nearly 100% standing dead trees with hydrophobic soils), and downslope from these high-severity patches, ephemeral creeks turned into deep draws of mass-wasting, with loose soil, cobble and large boulders transported downslope from their former "permanent" locations. The severe erosion made east-west travel on the southern boundary very difficult, both on and off trail. We recommend in future years to use the Red Blanket Falls trailhead only for the first 0.5 to 1.0 miles, and then approaching areas further east from above. At day's end, we discovered lots of weeds by ephemeral drainages near the highly-eroded slopes by the southern boundary of the Park. With many of these weeds in flower, time was of the essence to pull as many remaining weeds as we could before seed set – this drove the focus of all later site visits: to pull weeds from neighboring drainages before seeds were released (Table 5). In October, a multi-branch field trip was organized by botanist Jen Beck, who guided the FMO and stream ecologist on a tour of the burn unit – this visit was geared more towards landscape and fire ecology than exotic plant issues.

Table 5. Weeds pulled from Lonesome Burn, 2011.

Species	Density
<i>Cirsium arvense</i>	1
<i>Cirsium vulgare</i>	1,241
<i>Hypericum perforatum</i>	519*
<i>Lactuca serriola</i>	229
<i>Rumex crispus</i>	0 (none pulled; species confirmed at last visit)
<i>Senecio serriola</i>	10
<i>Senecio sylvaticus</i>	7,088
<i>Sonchus arvensis</i>	1
<i>Taraxacum officinale</i>	2
Total	9,091

*total derived from Lonesome Burn Activities Report by Cameron Rolle, September 6, 2011 – total pulled not seen in database printout.

For more details on 2011 Lonesome Burn activities and findings, please see the Lonesome Burn 2011 Report.

WEEDS BY SPECIES

The following are summaries of the status of Park exotic plants that are of greatest concern, either for their sheer numbers or their tenacity.

Hypericum perforatum

St. Johnswort (“Hypper”) has been located in more generalized locations in the Park (10) than any other species (Appendix A), from areas of high human impact (e.g., roadsides, headquarters) to isolated locations within the Park (i.e., Lonesome burn, one patch on the shores of Crater Lake). Hypper cannot be eradicated by hand-pulling, unless a population is caught very early in its establishment. This is why for five consecutive years, the Park has had an annual summer application of the herbicide Vista in easily accessed locations. In the last few years we have located three new populations of well-established St. Johnswort, all of which are difficult to access. Currently, we are only able to hand-pull these locations, preventing the development of new seed. Unfortunately, root fragments will still remain in the soil, which will produce more flowering plants the following year. The two Hypper populations in the Lonsesome burn area are not only time-consuming to reach, but are on very steep, south-facing slopes. Additionally, there remains much of that southward-tending steep mountainside terrain that remains unsurveyed for weeds.

Recommendations: a 6th application of Vista in 2012 if possible; hand-pull in Lonsesome if time permits. With decreased overstory cover, there is a greater potential for new neighboring St. Johnswort populations in the Lonesome burn area.

Rumex acetosella

Sheep sorrel (“Rumace”) thus far is found primarily by the roadsides in Crater Lake National Park. It is likely our most wide-spread weed, presenting itself in the largest number of patches of any Park exotic. Once established, Rumace spreads out quite rapidly, inundating roadside areas, spreading out along roadsides, or along walkways into meadows (i.e. the walkway between the lodge and the Garfield Peak trailhead). Sheep sorrel is very time-consuming to remove by hand, which creates a lot of soil disturbance as its many rhizomes branch out, creating new plants as it creeps, web-like into new territory. In 2011, the botany crew spent quite a few hours pulling nearly 10,000 Rumace plants in just a handful of locations (Table 6). Still, many populations remain unweeded due to time-constraints and the inefficacy of hand-pulling as a means of eradicating this species.

Rumace flowers early in the summer (beginning approximately one month before Hypper), so if we were to try an herbicide treatment, treatment times may not coincide.

Table 6. Sheep sorrel plants hand-pulled in 2011.

Location	Number of plants pulled/ Patch size
South Highway 62	2,558 Rumace + one 2 – 5m2 patch
Munson Valley Road	6 – 10m2
Rim Road	100
Headquarters	57
Rim Village (near Garfield trailhead)	5,140

Cirsium arvense

There are two known locations for Canada thistle (“Cirarv”): along the shores of Crater Lake, and at Spruce Lake. High lake levels helped subdue, but not suppress, these populations. It would seem that high water levels and caterpillar predation on Watchman bench thistles are our two allies in combating

this weed until we come up with a more effective solution. As with St. Johnswort, Cirarv reproduces primarily by rhizomes (and when hand-pulled, rhizome *fragments*). In the meantime, although we may be able to prevent new populations from cropping-up with annual hand-pulling efforts, subterrean roots will remain, reviving these populations each summer.

A previous Cirarv sighting in the Panhandle in 2009 was revisited in 2011, and was found to have likely been bull thistle, its less noxious cousin.